



A CRISIL-NSIC RATED COMPANY
ISO-9001-2008 COMPANY

Member Of



AIMCAL (USA)



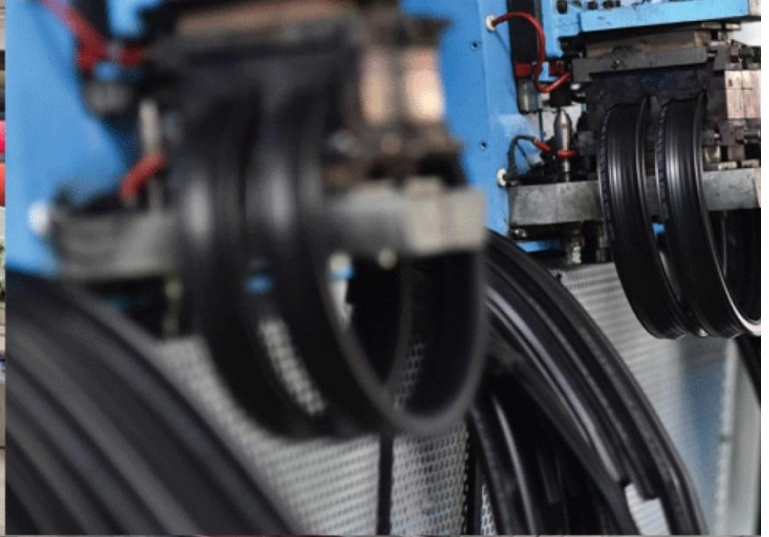
A.M.P.E.R.E (EUROPE)

In Association With



ELECTRO MAGNETIC innovative technologies

Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC, Anand Nagar, Ambarnath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com



**Batch Microwave+Convection Heat
Treatment for Sterilization of Oats**



ELECTRO MAGNETIC Innovative technologies



A CRISIL-NSIC RATED COMPANY
ISO-9001-2008 COMPANY

Kerone Research & Development Centre (KRDC)

B/47,Addl. MIDC. Anand Nagar, Ambarnath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

Customer :	M/s Marico Ltd.
Process :	Batch Microwave+Convection Heat Treatment for Sterilization of Oats

TEST REPORT No: 47/KRDC/LAB/17 Mum 09/10/2018

Date Sample reception : 09/10/2018
ID : 47/LAB/57

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 300 kg
Sampling date : 14/11/2018
Product : Oats
Requirement : Sterilization and disinfection of Oats
Start Date test : 14/11/2018
End Date test : 14/11/2018

LABORATORY EXPERIMENTAL SET UP:



Format: F/R&D/01



Kerone Research & Development Centre (KRDC)

B/47, Addl. MIDC. Anand Nagar, Ambarnath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

LAB BATCH MICROWAVE+CONVECTION HEATING SYSTEM SPECIFICATIONS:

Microwave Power	2 kW(CW)
Frequency	2450 MHz \pm 50
Convective Power	3.5 kW (air flow 350 l/min at 20°C)
Microwave Exposure Zone (cavity)	1 cubic meter
Mode Stirrer	One
Thermal Monitoring System	Single Channel Fiber Optic: Range -40 to 250°C
Exhaust Power	1HP
Tray Size	450x950x50 mm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	27.8°C (\pm 5°C)
Humidity (%)	\leq 63% RH
Pressure (kN/m² or kPa)	Not recorded

Note for recommendation: Environmental conditions have a direct impact on test results. Accuracy and consistency of test data are affected by the laboratory conditions



ELECTRO MAGNETIC Innovative technologies






KERONE

A CRISIL-NSIC RATED COMPANY
ISO-9001-2008 COMPANY

Kerone Research & Development Centre (KRDC)

B/47, Addl. MIDC. Anand Nagar, Ambarnath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model :FLIR E-30 Resolution: 160x 120IR Thermal sensitivity of 0.10°C
Moisture Analyzer		Make: Axis Balance Description: Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample>5g)
Thermo Hygrometer		Model No: HTC-2 Temperature accuracy: ±°C (1.8°F) Temperature resolution: 0.1°C (0.2°F) Humidity range: 10%~99% RH Humidity accuracy: ±5% RH Humidity resolution: 1% RH

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on oats samples without adding any additive to speed up the drying rate for sterilization treatment. For this experimental run, oats has been sealed packed in nags and then microwave treatment has been given. The observations are made for various parameters. Initial moisture content, final moisture content and visible motility test has been taken.

Format: F/R&D/01



ANALYTICAL RESULTS:

Trial No.	Power (kW)	Chamber Temp(°C)	Hot Air Temp(°C)	Cycle Time (minutes)	Product Temp(°C)	Initial Moisture (%)	Final Moisture (%)	Motility Test
1.	2	80	60	5	88	9.4	9.27	-ve
2.	1.5	80	60	5	78	9.4	9.2	-ve
3.	1	80	60	5	61	9.4	7.9	-ve
4.	1	80	60	5	60	9.4	8.16	-ve
5.	1	80	60	5	64	9.4	7.1	-ve
6.	0.8	80	60	5	58	9.4	8.46	-ve
7.	0.8	80	60	5	60	9.4	8.34	-ve
8.	0.6	80	60	5	54	9.4	9.83	-ve
9.	1	80	60	3	56	9.4	8.6	-ve
10.	1.5	80	60	1	45	9.4	8.66	-ve

OBSRVATIONS:

The Drying behavior of oats has been investigated under the microwave+convection heating system for sterilization treatment. The drying rate is found to be increasing with respect to increasing drying time. As per physical investigation, it has been observed that there is in no alive insects in treated samples.

Miss Komal Bhoite
Tested By

Format: F/R&D/01